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**IN THE UNITED STATES PATENT  
AND TRADEMARK OFFICE**

Applicant(s): Andries ELLENS et al.

Serial No. : (Not Yet Assigned)

Filed : CONCOMITANTLY HEREWITH

For : HIGHLY EFFICIENT  
FLUORESCENT MATERIAL

Art Unit :  
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Julie Harting  
Julie Harting

**PRELIMINARY AMENDMENT**

Asst. Commissioner for Patents  
Washington, D.C. 20231

S I R :

Please amend the above-identified application as follows:

**IN THE ABSTRACT**

Please replace the Abstract with a new Abstract appended hereto.

**IN THE SPECIFICATION**

Please disregard the page numbering shown in the specification and use the actual line numbering.

Page 1, replace the heading "Technical Field" (see attachment for details of changes) with

--FIELD OF THE INVENTION--

replace the heading "Prior Art" (see attachment for

details of changes) with

--BACKGROUND OF THE INVENTION--

replace paragraphs 3 and 4 as follows:

--It is an object of the present invention to provide a floorescent material from the class of the silicide nitrides having a cation and the basic formula  $A_xSi_yN_z$ , the efficiency of which is as high as possible, and which can be effectively stimulated by UV radiation in the region of 370 to 430 nm.

This and other objects are attained in accordance with one aspect of the invention directed to a highly efficient fluorescent material from the class of the silicide nitrides having a cation and the basic formula  $A_xSi_yN_z$ , characterized in that Sr is used as cation, the silicide nitride being doped with trivalent Ce which acts as activator.--

Page 3, replace the heading "Figures" (see attachment for details of changes) with:

--BRIEF DESCRIPTION OF THE DRAWINGS--

Delete lines 10-12 in their entirety (see attachment for details of changes).

replace the heading "Description of the drawings" (see attachment for details of changes) with:

--DETAILED DESCRIPTION OF THE DRAWINGS--.

IN THE CLAIMS:

Please amend claim 5, (see attachment for details of changes) as follows:

5. (Amended) A light source having a primary radiation source, which emits radiation in the shortwave region of the optical spectral region in the wavelength region of 370 of 430 nm, this radiation being converted wholly or partially into secondary radiation of longer wavelength in the visible spectral region by means of a first fluorescent material as claimed in claim 1.

Respectfully submitted,

  
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ATTACHMENT

5. (Amended) A light source having a primary radiation source, which emits radiation in the shortwave region of the optical spectral region in the wavelength region of 370 of 430 nm, this radiation being converted wholly or partially into secondary radiation of longer wavelength in the visible spectral region by means of a first fluorescent material as claimed in [one of the preceding claims] claim 1.

## ABSTRACT OF THE DISCLOSURE

Fluorescent material from the class of the silicide nitrides, Sr being used as cation, and the silicide nitrides being doped with trivalent Ce.

MARKED-UP COPY OF SPECIFICATION AND ABSTRACT  
SHOWING CHANGES MADE THERETO

Patent-Treuhand-Gesellschaft  
für elektrische Glühlampen mbH., Munich

Highly efficient fluorescent material

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FIELD OF THE INVENTION

[Technical field] A

The invention proceeds from a fluorescent material from  
the class of the silicide nitrides in accordance with  
10 the preamble of claim 1. In particular these are  
silicide nitrides which fluoresce in the yellow region.

Prior art) BACKGROUND OF THE INVENTION

15 Fluorescent materials of the silicide nitride type such  
as  $\text{Sr}_2\text{Si}_5\text{N}_8$  and  $\text{Ba}_2\text{Si}_5\text{N}_8$ , already known from the article  
by Schlieper, Millus and Schlick: Nitridosilicate II,  
Hochtemperatursynthesen und Kristallstrukturen von  
 $\text{Sr}_2\text{Si}_5\text{N}_8$  und  $\text{Ba}_2\text{Si}_5\text{N}_8$  [Silicide nitrides II, high-  
20 temperature syntheses and crystal structures of  $\text{Sr}_2\text{Si}_5\text{N}_8$   
and  $\text{Ba}_2\text{Si}_5\text{N}_8$ ], Z. anorg. allg. Chem. 621, (1995), page  
1380. However, in this case no activators are specified  
which would suggest efficient emission in specific  
regions of the visible spectrum.

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Summary of the invention

It is an object of the present invention to provide a  
fluorescent material [from the class of the silicide nitrides  
30 in accordance with the preamble of having a  
claim 1], the efficiency of which is as high as cation  
possible, and which can be effectively stimulated by UV and the  
radiation in the region of 370 to 430 nm. basic formula  
 $\text{Ax Si}_y \text{N}_z$

This object is achieved by the characterizing features  
35 of claim 1. Particularly advantageous refinements are  
to be found in the dependent claims]

There is as yet no yellow-emitting fluorescent material  
of high efficiency which can be effectively stimulated

and other objects are attained in accordance with one aspect of the  
invention directed to a highly efficient fluorescent material from the  
class of the silicide nitrides having a cation and the basic formula  
 $\text{Ax Si}_y \text{N}_z$ , characterized in that Sr is used as cation, the silicide nitride  
being doped with trivalent Ce which acts as activator

DOCUMENT-CODED

per se; for example,  $\text{BaMgAl}_{10}\text{O}_{17}\text{Eu}^{2+}$  (known as BAM) or  $\text{Ba}_5\text{SiO}_4(\text{Cl}, \text{Br})_6\text{Eu}^{2+}$  or  $\text{CaLa}_2\text{S}_4\text{Ce}^{3+}$  or else  $(\text{Sr}, \text{Ba}, \text{Ca})_5(\text{PO}_4)_3\text{Cl}:\text{Eu}^{2+}$  (known as SCAP). A red fluorescent material can be used, in addition, in order to improve the color of this system.  $(\text{Y}, \text{La}, \text{Gd}, \text{Lu})_2\text{O}_2\text{S}:\text{Eu}^{3+}$ ,  $\text{SrS}:\text{Eu}^{2+}$  or else  $\text{Sr}_2\text{Si}_5\text{N}_8:\text{Eu}^{2+}$  (not yet published, see EP-A 99 123 747.0) are particularly suitable.

## BRIEF DESCRIPTION OF THE DRAWINGS

## [Figures] ▾

The aim below is to explain the invention in more detail with the aid of two exemplary embodiments. In the drawing:

- 15 Figure 1 shows an emission spectrum of a first  
silicide nitride;  
Figure 2 shows the reflection spectrum of this  
silicide nitride;  
Figure 3 shows an emission spectrum of a second  
20 silicide nitride;  
Figure 4 shows the reflection spectrum of this  
silicide nitride;  
Figure 5 shows a semiconductor component which serves  
as light source for white light; and  
25 Figure 6 shows an emission spectrum of a mixture of  
three fluorescent materials.

## DETAILED DESCRIPTION OF THE [Description of the drawings] DRAWINGS

- 30 A concrete example of the fluorescent material according to the invention is shown in Figure 1, which concerns the emission of the fluorescent material,  $\text{Sr}_2\text{Si}_5\text{N}_8:\text{Ce}^{2+}$ , the Ce proportion amounting to 4 mol% of the lattice sites occupied by Sr. The emission maximum is at 545 nm, and the mean wavelength at 572 nm. The color locus is  $x=0.395; y=0.514$ . The stimulation is performed at 400 nm.

The production is performed in the usual way, the

ABSTRACT OF THE DISCLOSURE  
[Abstract] A

[Highly efficient fluorescent material]

Fluorescent material from the class of the silicide nitrides, Sr being used as cation, and the silicide nitrides being doped with trivalent Ce.

[Figure 1]